

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year)

13 August 1999 (13.08.99)

International application No.

PCT/SE98/02359

Applicant's or agent's file reference

2988958

International filing date (day/month/year)

17 December 1998 (17.12.98)

Priority date (day/month/year)

18 December 1997 (18.12.97)

Applicant

BOHM, Christer et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

13 July 1999 (13.07.99)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

A. Karkachi

Telephone No.: (41-22) 338.83.38

BEST AVAILABLE COPY

## PCT

WIPO

PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2988958	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE98/02359	International filing date (day/month/year) 17.12.1998	Priority date (day/month/year) 18.12.1997
International Patent Classification (IPC) or national classification and IPC <sub>7</sub> H 04 Q 11/04, H 04 L 12/52, H 04 L 12/43		
Applicant Net Insight AB et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  13.07.1999	Date of completion of this report  03.05.2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Jan Silfverling/CL Telephone No. 08-782 25 00

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02359

## I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages \_\_\_\_\_, as originally filed,  
 pages \_\_\_\_\_, filed with the demand,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☐ the claims, Nos. \_\_\_\_\_, as originally filed,  
 Nos. \_\_\_\_\_, as amended under Article 19,  
 Nos. \_\_\_\_\_, filed with the demand,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☐ the drawings, sheets/fig \_\_\_\_\_, as originally filed,  
 sheets/fig \_\_\_\_\_, filed with the demand  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_,  
 sheets/fig \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/fig \_\_\_\_\_

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02359

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-29</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-29</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-29</u>	YES
	Claims		NO

**2. Citations and explanations**

The claimed invention relates to a method, an apparatus and a switch for switching data transferred in circuit switched channels between at least three unidirectional multi-channel time division multiplexed bitstreams that are accessed at respective ports of a switch. Data is transferred between said ports in circuit switched channels of an internal unidirectional multi-channel time division multiplexed bitstream that is accessed by said ports. Each one of said at least three bitstreams as well as said switch internal bitstream is divided into cycles, which in turn are divided into time slots. According to the claimed invention, data read from a time slot position of a first bitstream at a first port is associated with a channel identifier. The channel identifier is then used at a second and a third port to map data into the bitstream connected to respective port.

In the Written Opinion of 16 March 2000 the following documents were discussed.

**Per Lindgren, "A Multi-Channel Network Architecture Based on Fast Circuits Switching", Licentiate Thesis, Royal Institute of Technology, Stockholm, ISSN 1103-534X, May 1996, (D1)** describes a circuit-switched network architecture that is based on Dynamic synchronous Transfer Mode (DTM). DTM is designed for a shared medium topology, which facilitates distributed switching. The shared medium also has inherent multicast capabilities since a slot can be read by several nodes on a bus (page 57- page 62).

Each prototype node is implemented, based on the ideas of distributed switching, to be used both as a switch node and to be attached to host interfaces. A prototype node consists of three types of units.

.../...

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

Firstly, a node has Fiber Access Units (FAU), each connecting the units in the node to one dual fiber bus. The FAU transfers data between the fiber and the other units in the node by multiplexing/demultiplexing between channels and slots. Secondly, a host obtains access to the DTM services through a Host Interface (HIF). Thirdly, a Node Controller (NC) controls the node and implements the DTM control protocol (DCP). The units in a node are connected by an interconnect that is implemented as a parallel Internal Ring Bus (IRB) (page 91- page 92).

All interfaces within a DTM prototype node are connected to an Internal Ring Bus (IRB), which handles the communication within the node (see Fig. 3.29). The interconnect can be seen as an internal switch fabric with ports. It is designed as a slotted ring bus on the backplane of the node (Fig. 3.32). One reason for using this design is that it is quite uncomplicated to support multicast by allowing the same data to be sent to several ports on the ring. To prevent congestion, the IRB is rate over-dimensioned, which guarantees that all four fiber units (FAU) of figure 3.32 will have access to the IRB for every slot in the cycle.

For each time slot on a fiber, the FAU first consults the channel table for incoming data. The FAU copies the contents of the slot and sends it on the Internal Ring Bus (IRB) tagged with a local address. The local address is divided into two parts, a physical address identifying the receiving unit, and a logical address used at the receiving unit. If the receiving unit is a host interface, the logical address is a logical channel identifier (LCI), which in turn is a local identifier of the channel. The Fiber Access Unit (FAU) performs the mapping between slot numbers and channels (page 93- page 98).

**Christer Bohm, " The DTM Protocol- Design and Implementation", Licentiate Thesis, Royal Institute of Technology, Stockholm, ISSN 1103-534X, February 1994, (D2)** also describes a circuit-switched network architecture that is based on Dynamic synchronous Transfer Mode (DTM). The slotted ring buses of an internal interconnect constitutes the switch fabric of a prototype node. There is one Internal Ring Bus (IRB) slot for each pair of adjacent units on the IRB and the IRB interface is a multi-channel interface (see fig. 28). Each IRB slot for each pair of adjacent units could be regarded as a channel.

.../...

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

Thus, the IRB is a multi-channel time division multiplexed bitstream that is accessed at respective ports connected to the IRB.

The FAU according to (D2) transfers data between the fiber and the other units in the node by multiplexing/demultiplexing between channels and slots. Its operation is table-driven; it has one channel table for outgoing data and one for incoming, and each table has one entry per slot in a cycle. For incoming data, a channel identifier is used as a logical channel identifier in the host. When data enters the switch fabric, a local address tag is attached to the data item by the HIF or the FAU. The address tag contains a unit identifier (UI) and a channel identifier. The UI indicates the destination for the data item. For outgoing data, the channel identifier is used for addressing a slot number on the fiber bus and there is also a cycle buffer, where data is stored until it is written to a slot on the fiber bus (page 46- page 55).

In addition to (D1) and (D2), the following documents are cited in The International Search Report:

**WO, 9736403, A1, (D3)** discloses synchronisation of parallel bitstreams (page 8, line 29 - page 10, line 15).

**Bohm et al., "The DTM Gigabit Network", Journal of High Speed Networks vol. 3 1994, (D4)** discloses principles for DTM.

**GB, 2263846, A, (D5)** discloses an interface unit able to transmit or receive data independently in desired time slots (claim 1).

**US, 5157657, A, (D6)** discloses data transmission between stations connected to a first and a second bus, where at least one station comprising means for receiving, processing, and outputting slots of data transmitted on said two buses during each of a plurality of cycles (e.g. claim 25).

**GB, 2238934, A (D7)** discloses a copy fabric used for packet multicast (abstract).

**WO, 9306675, A1, (D8)** discloses a self-routing non-blocking multicast network (claim 1).

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02359

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

The disclosures of documents (D3)-(D8) is not considered to bring a person skilled in the art to arrive at the invention as claimed in claims 1-29.

In the Written Opinion, it was stressed that the claimed invention according to claims 1-5, 7, 8, 13-19, 21, 22, 28 and 29 is not novel. Further, it was argued that the claimed invention according to claims 6, 9-12, 20 and 23-27 could not be considered to involve an inventive step with respect to the disclosures of (D1) and (D2).

In response to the Written Opinion, the Applicant has submitted supporting arguments regarding novelty and inventive step of the invention claimed. These arguments have resulted in that the Authority has adopted another, and different, opinion regarding patentable subject matter of the invention as claimed in claims 1-29.

The channel identifier (in D1 and D2), is used for identifying the slot that data should be mapped into, and the transfer of data is based on that the to which the data is to be sent is identified by the unit identifier (UI). Thus, the channel identifier is only used by the unit that is identified by the UI.

Since neither (D1), nor (D2), discloses or indicates the use of a common channel identifier for the mapping of data into slots in at least two ports, the invention claimed in claims 1-29 is novel.

To arrive at the invention as claimed in claims 1-29 from (D1) and (D2), one must solve the problem of enabling multicasting of data from one FAU to at least two FAUs. The method of the invention claimed, involving a common channel identifier is not considered the most probable way to solve this problem. The most probable way to solve this problem would be to duplicate the data from one slot position and send each copy on the IRB to other units using different unit identifiers. As already mentioned, a common channel identifier is not disclosed in either of (D1) and (D2).

It can not be considered obvious for a person skilled in the art to add a technical feature not disclosed and use this to solve a problem in a less probable way. Therefore, the invention as claimed in claims 1-29 is considered to involve an inventive step.

.../...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/SE98/02359

**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

Summary: The invention as claimed in claims 1-29 is novel and has industrial applicability. The invention as claimed in claims 1-29 is considered to involve an inventive step.



UP

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



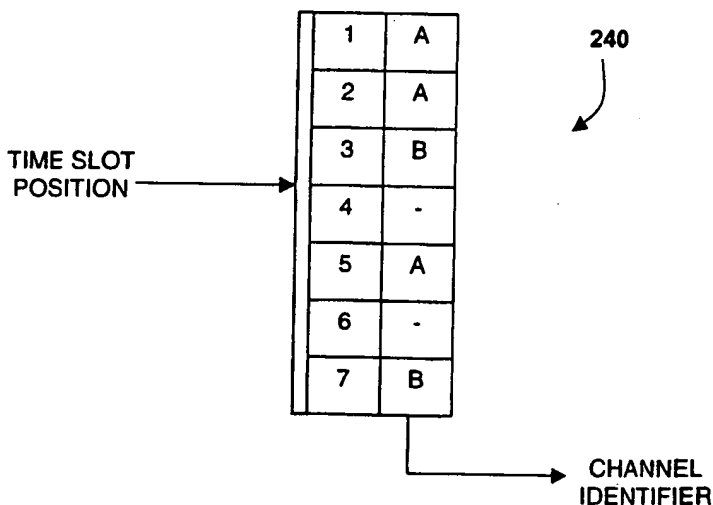
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H04Q 11/04, H04L 12/52, 12/43</b>		A3	(11) International Publication Number: <b>WO 99/31834</b>
			(43) International Publication Date: 24 June 1999 (24.06.99)
(21) International Application Number: PCT/SE98/02359		(81) Designated States: CN, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
(22) International Filing Date: 17 December 1998 (17.12.98)			
(30) Priority Data: 9704739-3 18 December 1997 (18.12.97) SE		Published With international search report.	
(71) Applicant (for all designated States except US): NET INSIGHT AB [SE/SE]; Ingenjörsvägen 3, S-117 43 Stockholm (SE).		(88) Date of publication of the international search report: 26 August 1999 (26.08.99)	
(72) Inventors; and (75) Inventors/Applicants (for US only): BOHM, Christer [SE/SE]; Varpholmsgränd 32, S-127 46 Skärholmen (SE). BOSTRÖM, Anders [SE/SE]; Mäster Simonsväg 14, S-170 66 Solna (SE). LINDGREN, Per [SE/SE]; Maria Prästgårdsgatan 12, S-118 52 Stockholm (SE).			
(74) Agent: AWAPATENT AB; P.O. Box 45086, S-104 30 Stockholm (SE).			

(54) Title: METHOD AND APPARATUS FOR SWITCHING DATA BETWEEN BITSTREAMS OF A CIRCUIT SWITCHED TIME DIVISION MULTIPLEXED NETWORK

(57) Abstract

The present invention refers to a method and an apparatus for switching data in a circuit switched synchronous time division multiplexed network from a first bitstream, being received at a first port of a switch, to a second and a third bitstream, being transmitted from a second and a third port, respectively, of said switch. According to the invention, data read from a time slot position of said first bitstream at said first port is associated with a channel identifier that identifies a channel that said time slot position forms part of. The channel identifier is then used at said second port for mapping said data into a time slot position of said second bitstream as well as at said third port for mapping said data into a time slot position of said third bitstream.



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/02359

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 11/04, H04L 12/52, H04L 12/43  
According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04L, H04Q, H04J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIL, EDOC, INTERNET, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Per Lindgren, "A Multi-Channel Network Architecture Based on Fast Circuit Switching", Licentiate Thesis. Royal Institute of Technology, Stockholm, ISSN 1103-534X, May 1996 see page 57-67; page 91 - page 111; page 157 - page 161 --	1-29
Y	WO 9736403 A1 (NET INSIGHT AB), 2 October 1997 (02.10.97), page 8, line 29 - page 10, line 15; page 11, line 32 - page 17, line 27; page 19, line 6 - page 21, line 24, figures 5,7,8,9, claims 1-39 --	1-29

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

18 June 1999

Date of mailing of the international search report

24.06.1999

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Erik Johannesson/MN

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 98/02359

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2238934 A (ADAPTIVE CORPORATION), 12 June 1991 (12.06.91), page 5, line 19 - page 11, line 35, figure 3, claims 1-24 --	1-29
X	Christer Bohm, "The DTM Protocol-Design and Implementation", Licentiate Thesis, Royal Institute of Technology, Stockholm, ISSN 1103-534X, February 1994 see page 25-55; fig 5,7,10,13,14,19,23,25,26,28 --	1-29
A	GB 2263846 A (NOKIA TELECOMMUNICATIONS OY), 4 August 1993 (04.08.93), page 2, line 15 - page 3, line 9; page 7, line 33 - page 8, line 31, figures 3,4 --	1-29
A	Journal of High Speed Networks, Volume 3, 1994, Christer Bohm et al, "The DTM Gigabit Network, Journal of High Speed Networks" see page 109 - page 126; figures 5,6,7,8 --	1-29
A	US 5157657 A (PHILIP G. POTTER ET AL), 20 October 1992 (20.10.92), claims 1-26 --	1-29
A	WO 9306675 A1 (COMMUNICATIONS SATELLITE CORPORATION), 1 April 1993 (01.04.93), claims 1-7 -- -----	1-29

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

01/06/99

International application No.  
PCT/SE 98/02359

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9736403 A1	02/10/97	AU 2315097 A	17/10/97
		EP 0850343 A	01/07/98
		EP 0886935 A	30/12/98
		SE 508889 C	16/11/98
		SE 9601132 A	10/10/97
-----			
GB 2238934 A	12/06/91	NONE	
-----			
GB 2263846 A	04/08/93	DE 4301733 A	05/08/93
		FI 388 U	23/11/92
		FI 90173 B,C	15/09/93
		FI 920444 D,V	02/07/92
-----			
US 5157657 A	20/10/92	AU 623953 B	28/05/92
		AU 4596889 A	21/06/90
-----			
WO 9306675 A1	01/04/93	NONE	
-----			